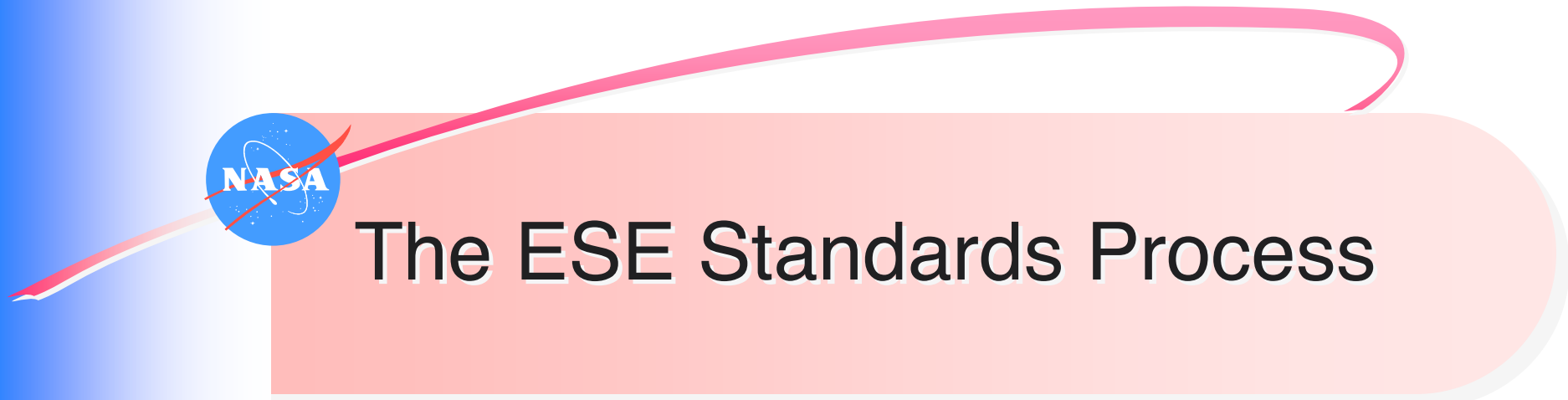


The ESE Standards Process

A Strategy to Adopt Standards that Work

Abstract

- NASA’s Earth Science Enterprise (ESE) anticipates that effective adoption of standards will play an increasingly vital role in success of future science data systems. As part of a study entitled "Strategy for Evolution of ESE Data Systems (SEEDS)”, we developed a process for both identification of appropriate standards and subsequent adoption for use by the Enterprise. The process, refined through study of ESE management priorities and through interaction with ESE target communities, is modeled on that of the "Internet Engineering Task Force (IETF).”
- The Standards Process Group (SPG), a board composed of ESE stakeholders, directs the process. Proposed standards are submitted by practitioners within the ESE community. These are evaluated in three phases by the SPG and the broader community to

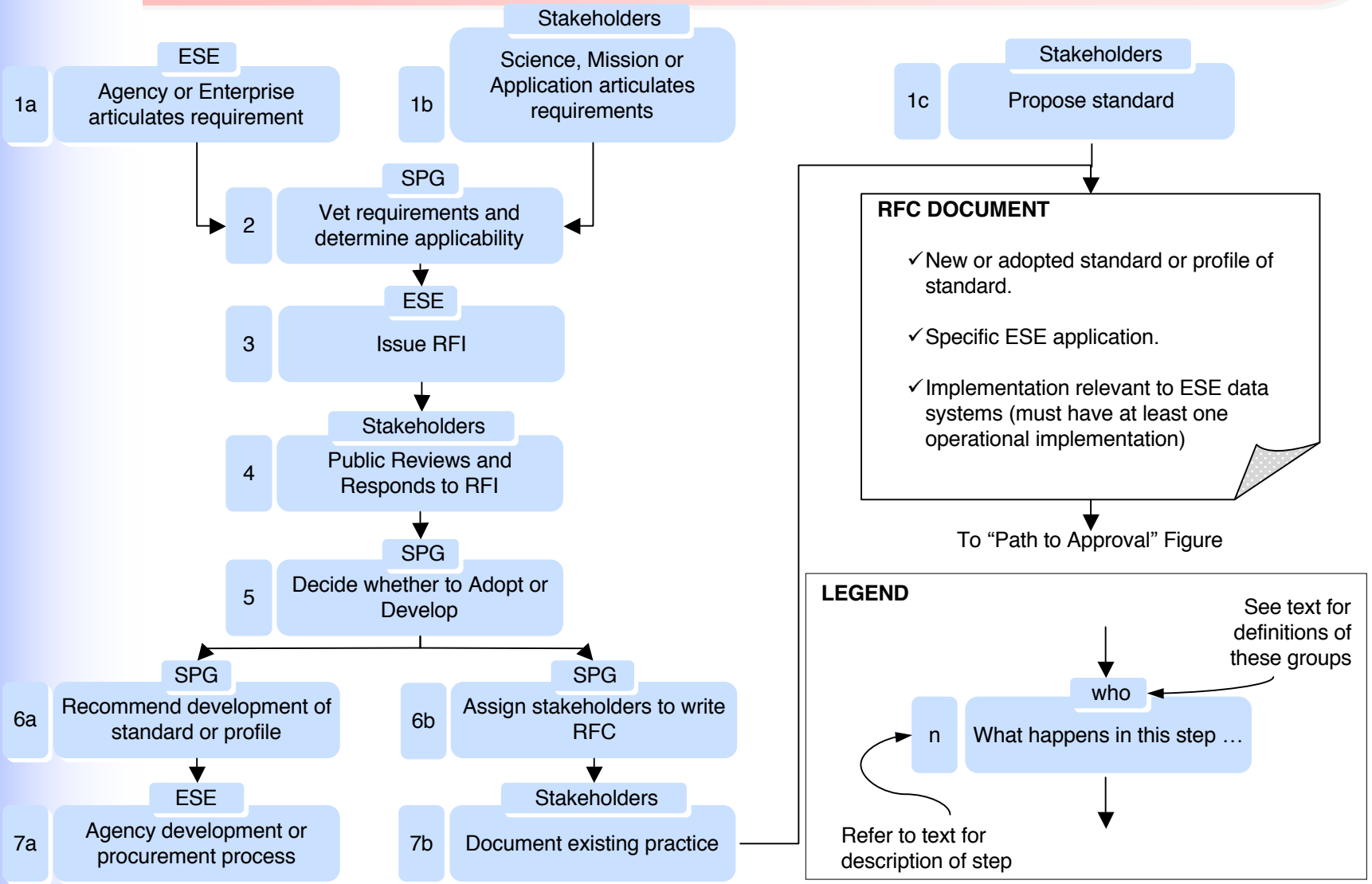
Process Results

- The proposed process will result in the following beneficial characteristics:
  - Credibility - "peer" and "stakeholder" review of proposed standards will establish trust that standards are sound.
  - Transparency - within the ESE and allied communities, the progress of standards decisions will be evident
  - Workability - implementation examples and evidence of operational success will encourage adoption of standards that are known to work
  - Timeliness - standards adoption will keep up with technological innovation and fit into the schedule needs of missions.
  - Relevance - standards will be responsive to ESE mission, science and data systems requirements.

Impact to Data Systems

- The adoption of interoperability standards will benefit the future evolution of ESE data systems:
  - Lower Cost - Adoption of standards results in lower costs for data system maintenance and replacement cycles.
  - Lower Risk - Adoption of proven standards assures that ESE data systems continue to be effective.
  - Greater Flexibility - Standards establish interoperability among ESE data systems analogous to “plug-and-play”.
  - Greater Innovation - Standards for data systems mean that ESE activities can pursue science and application innovation.

Path to RFC


ESE
1a
Agency or Enterprise articulates requirement
Stakeholders
1b
Science, Mission or Application articulates requirements
Stakeholders
1c
Propose standard
SPG
2
Vet requirements and determine applicability
RFC DOCUMENT
✓New or adopted standard or profile of standard.
✓Specific ESE application.
✓Implementation relevant to ESE data systems (must have at least one operational implementation)
ESE
3
Issue RFI
Stakeholders
4
Public Reviews and Responds to RFI
To "Path to Approval" Figure
SPG
5
Decide whether to Adopt or Develop
LEGEND
See text for definitions of these groups
who
n
What happens in this step …
Refer to text for description of step
SPG
6a
Recommend development of standard or profile
SPG
6b
Assign stakeholders to write RFC
ESE
7a
Agency development or procurement process
Stakeholders
7b
Document existing practice

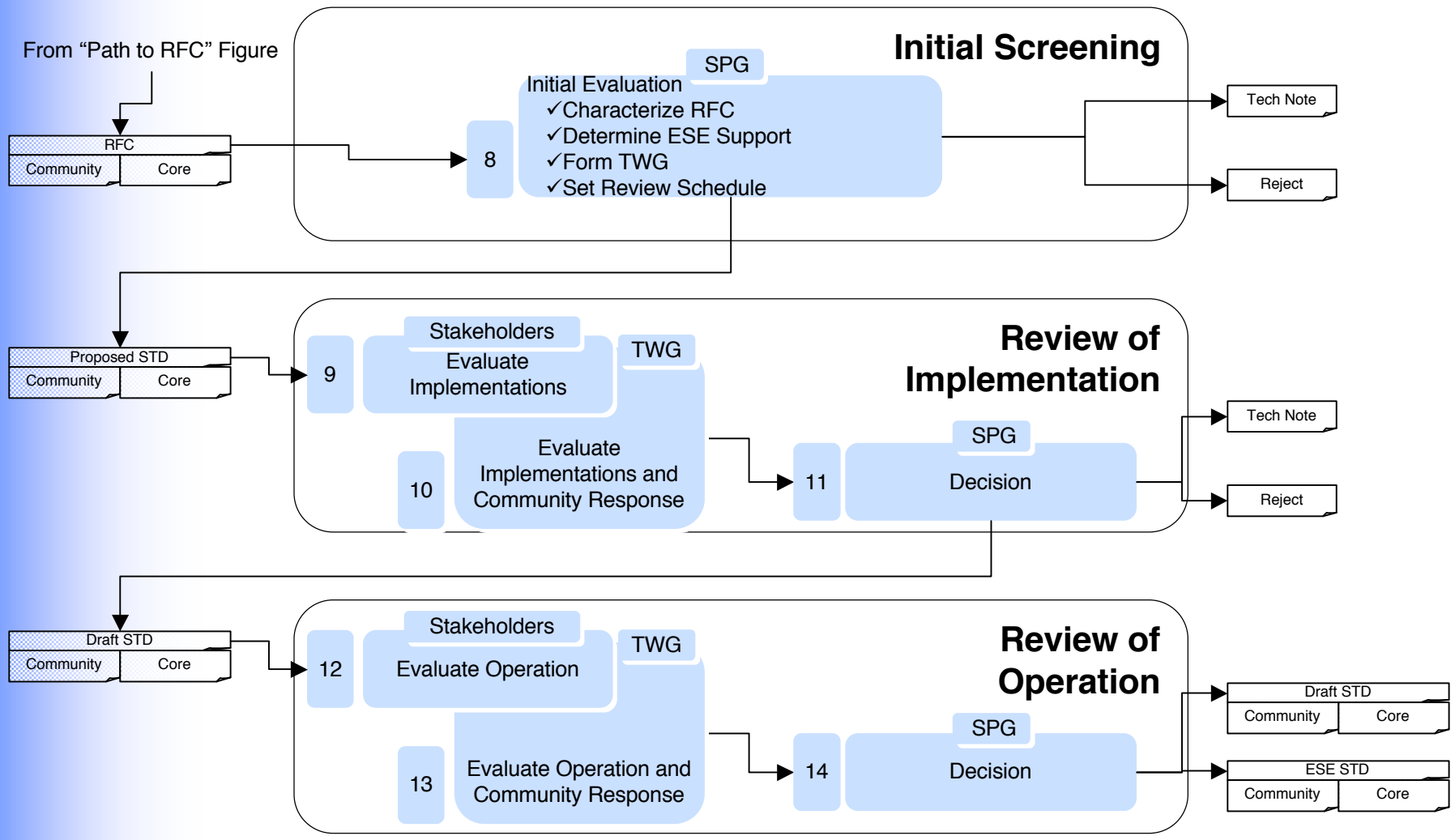
Path to RFC
Directed or Organic Paths

- The ESE Standards Process manages production and promotion of standards specification documents called “Requests for Comments” (RFCs). RFCs may be “directed” in response to identified ESE requirements or may arise “organically” from the community of ESE stakeholders.
  - RFCs are directed in response to an identified need through a process of top-down analysis and solicitation via steps 1 through 7. The SPG will facilitate analysis of the requirement and solicitation of solutions. The SPG will assign a stakeholder to write and submit an RFC describing existing practice, or, if no appropriate standard exists, new development will be done via normal NASA development or procurement methods.
  - The organic path is shown as step 1c. This path short-circuits up-front analysis by the SPG. Standard RFCs flow directly from ESE data systems stakeholders who will propose working standards based on their own implementation or experience.

Path to RFC (continued)
Directed or Organic Paths

- By either path, an RFC will be generated that defines or describes the standard and also specifies the data systems components or aspects to which the proposed standard would apply. The RFC will also list relevant implementation and operational references.

Path to Approval



Path to Approval
3-Phase Process

- RFCs are evaluated in three phases. Successful outcome at each phase results in advancement from "Submitted Standard" to "Proposed Standard" to "Draft Standard" to "ESE Standard".
  - The SPG first determines applicability to ESE science data systems goals and that materials necessary for review of the proposal and of reference implementations are available. The SPG forms a "Technical Working Group" (TWG), sets a schedule for review and releases the RFC as a " Proposed Standard". The SPG may otherwise reject the submission, or publish it as a "Technical Note."

Path to Approval (continued)
3-Phase Process

- Stakeholders, broadly defined, may comment on the RFC. The TWG evaluates for technical soundness. After integrating community comments the TWG reports to the SPG. The SPG may recommend the RFC be promoted to " Draft Standard". Alternately, it may reject the RFC or publish it as a technical note. ESE management concurrence is required for promotion.
- Again, stakeholders, the TWG and SPG review the RFC - this time for operational experience. SPG recommendation may be promotion to “ESE Standard”, or, the RFC may indefinitely remain as draft. ESE standard status requires ESE management concurrence.

SEEDS Context

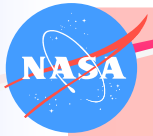
- Some principles and assumptions expressed in the SEEDS pre-formulation document, in interviews with stakeholders and in public workshops:
  - ESE data systems future selection and management will emphasize flexibility and accountability over centralization.
  - Diversity in ESE data systems implementation will be encouraged with coordination at the interfaces.
  - Future systems will be more distributed geographically, functionally and managerially.
  - Standards are available, the ESE need not develop unique standards, but rather adopt appropriate standards by drawing on technical expertise from the wider Earth science community.
  - There are no one-size-fits-all standards. Different communities of use require different standards.
  - The ESE should only mandate use of standards that have been shown to work in the ESE context.

Process Model Comparisons

- The SEEDS study examined several models for standards development and adoption. These included ISO TC211, OGC, W3C, CCSDS, FGDC and IETF. The team recommended building an ESE process based on Internet Engineering Task Force (IETF) model. IETF benefits:
  - Openness
  - Potential for speedy decision-making
  - Emphasis on working implementations
  - Simple, effective, open documentation practices
  - Consensus decision making
  - History of success of Internet validates model for information interface standards.

Tailoring for ESE

- Data systems for NASA's ESE have additional requirements. To accommodate ESE needs, the IETF example is modified to better reflect:
  - Timeliness: ESE data systems developers work to a schedule. Standards decisions must support mission schedules.
  - Resource Impacts: Adoption of standards may involve costs that are outside a mission's profile. Standards cannot be imposed if there are insufficient resources.
  - Accountability: A consultative process cannot bind the agency to use of particular standard. Policy decisions must be made by NASA management.



Contacts

- SEEDS Standards Process Group
  - http://eos.nasa.gov/seeds/SPG/
- Richard E. Ullman,
- NASA Goddard Space Flight Center
  - richard.ullman@nasa.gov